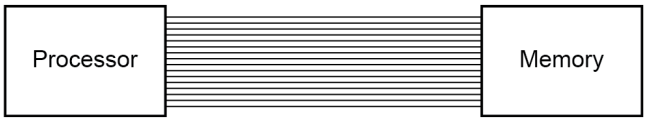
Worksheet 2 Processor performance Answers

Task 1 Word length

1. Memory is divided into equal units called **words**. Each word has a separate memory address.



A processor uses a word length of 16 bits and has an address bus of 16 lines.

(a) What is the maximum number of addressable words in memory? 2^{16} = 65,536

(b) What is the overall memory capacity in KiB? 65,536 x 2 bytes (16 bits) / 1024 = 128 KiB

(c) How does the width of the address bus affect system performance? Increases the number of addressable memory spaces available // Increases the maximum amount of primary storage. This indirectly affects system performance if large data files (e.g. image files) need to be manipulated or large programs executed. Also multi-processing will be more efficient as many processes can be held simultaneously in memory.

How does the width of the data bus affect system performance? Increases the data transfer rate // number of bits that can be transferred at one time, therefore increases system performance.

2. (a) Fill in the blanks from the words or phrases given below.

In computing, **word** is a term for the natural unit of data used by a particular processor design. A word is a fixed-sized piece of data handled as a unit by the instruction set or the hardware of the processor. The number of bits in a word (the word length) is an important characteristic of any specific processor design or computer architecture.

bits computer architecture computing instruction set piece of data processor word length

(b) Complete the table to say whether each of the following statements is true or false.

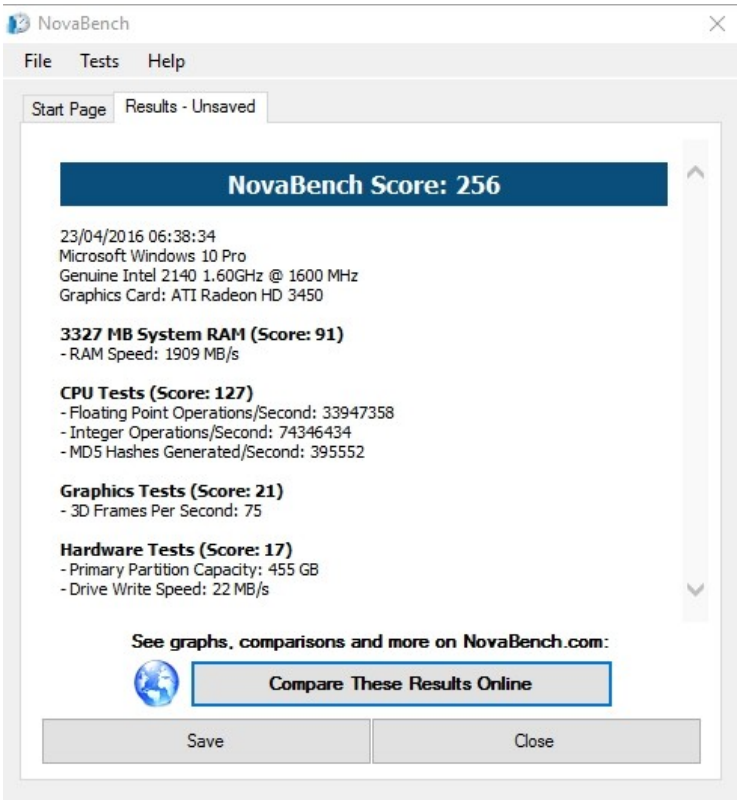
	True or False
One assembly language instruction is generally translated into several machine code instructions	False
The word length of the processor and the width of the address bus are factors in the format of a machine code instruction	True
Different types of computers have different architectures and therefore different machine code	True

instruction sets	
A processor with a 16-bit address bus cannot address more than 65,536 memory locations	True

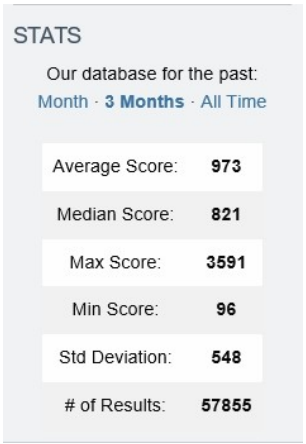
Task 2 – Testing system performance

3. Daniel tests the performance of his computer on the website https://novabench.com/

   He obtains the following results:



   He then compares them against average scores form other users:



   Suggest possible reasons why his computer is performing poorly against the average. Is there anything he could do to improve performance?

   If he has not switched his computer off for a long time, cache memory may be filled with data he is no longer using. Try switching off.

He could run a defrag utility on his disk

He could get another disk drive or SSD which might speed up disk access

If he can increase RAM that should help too.

4. Try benchmarking your own computer using the free downloadable software from the website.